

What is Highly Accelerated Stress Test Chamber ?

PC-304R9/PC-422R9

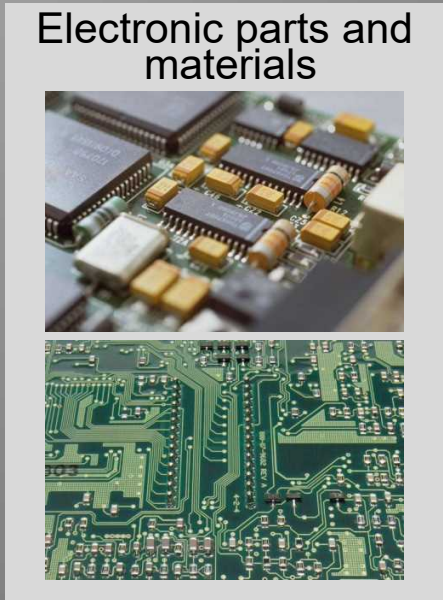
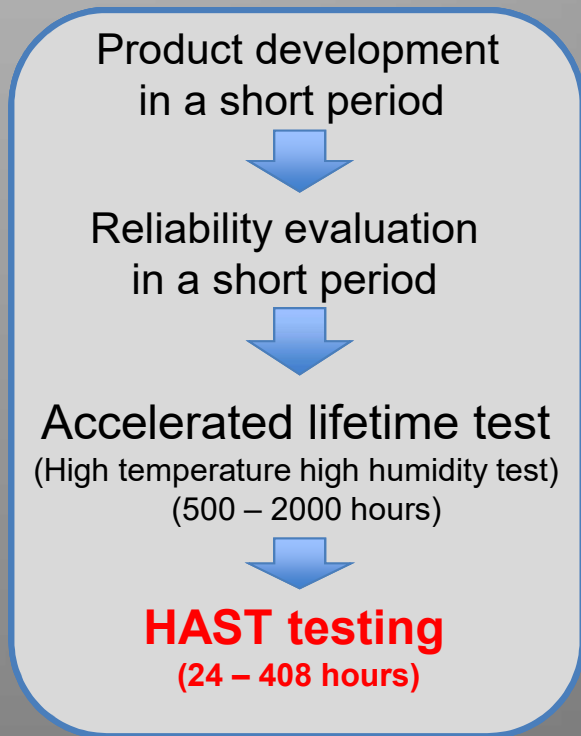


HIRAYAMA Manufacturing Corporation

Highly Accelerated Stress Test Chamber (HAST Chamber)

Equipment that can acceleratedly evaluate the lifetime (moisture resistance) of electrical and electronic parts such as semiconductors and various materials in a short time by applying stress that is more severe than the stress experienced under actual use conditions.

HAST = Highly Accelerated Stress Test

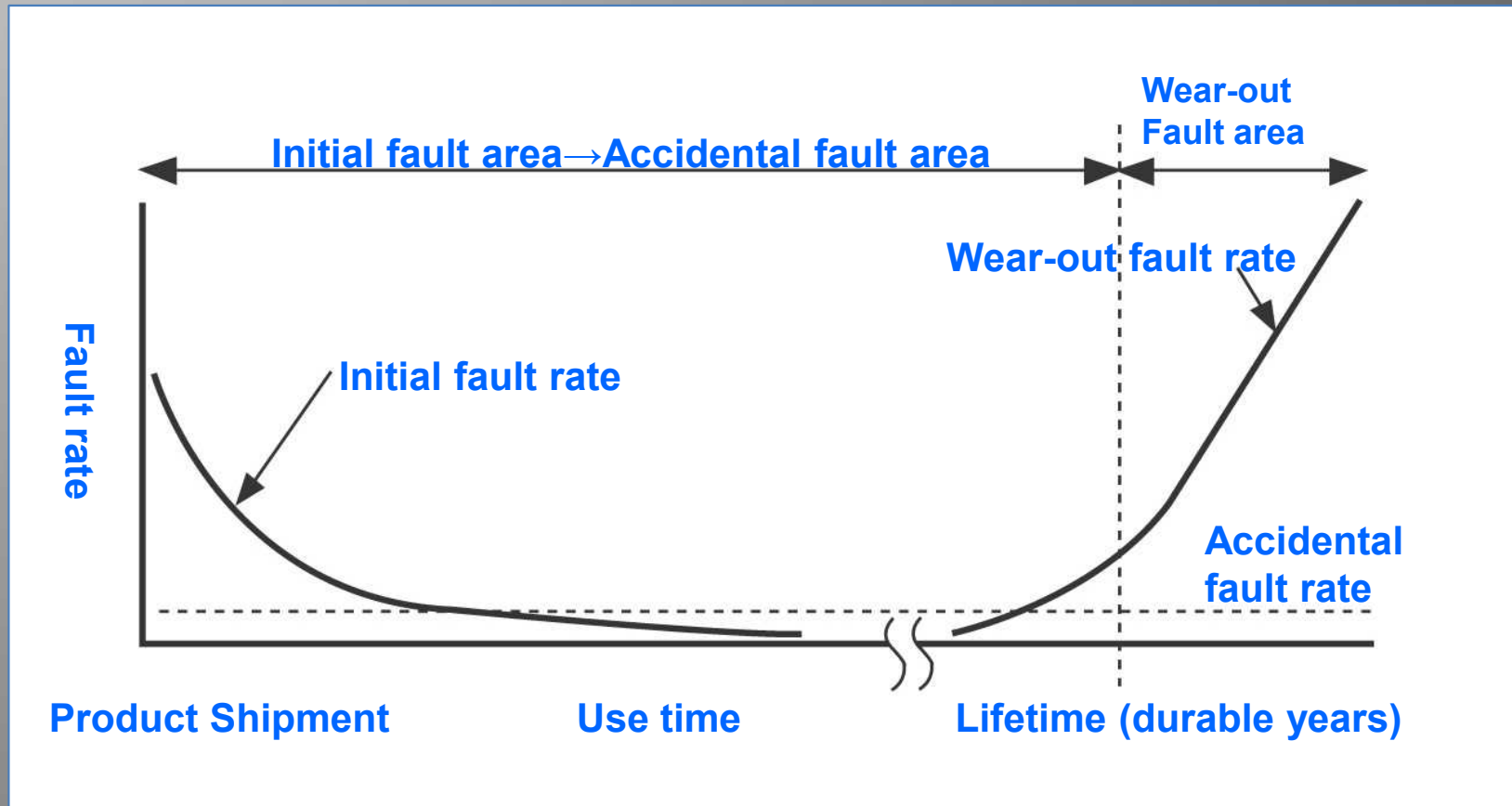


Accelerated Lifetime Evaluation in a short period



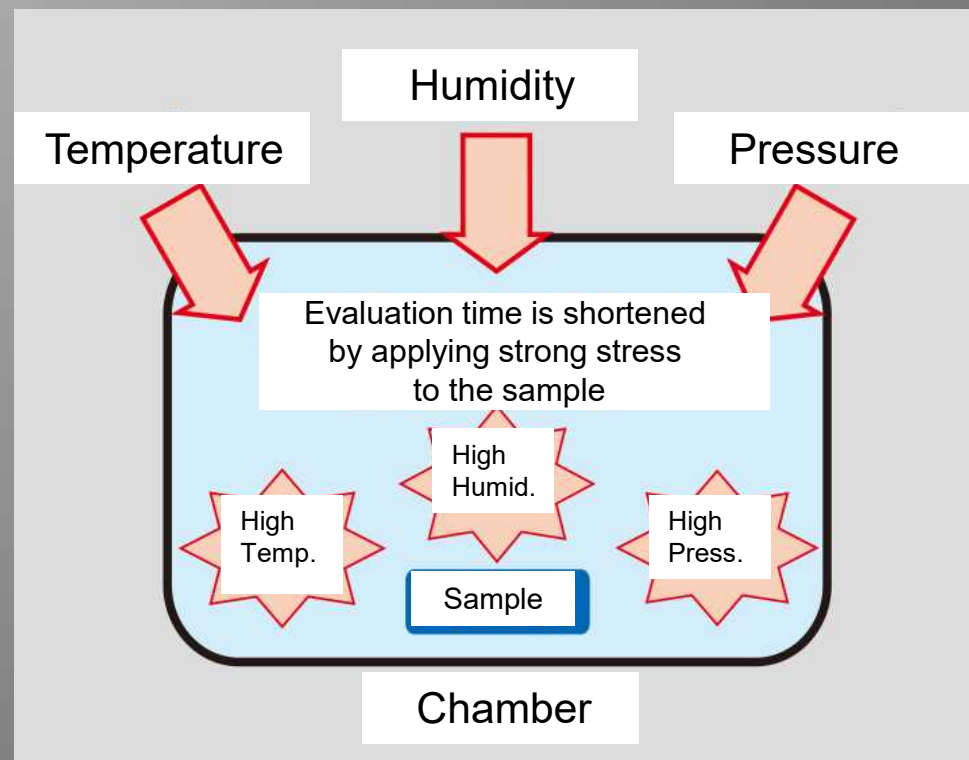
About Lifetime

Accelerated lifetime test related to moisture resistance



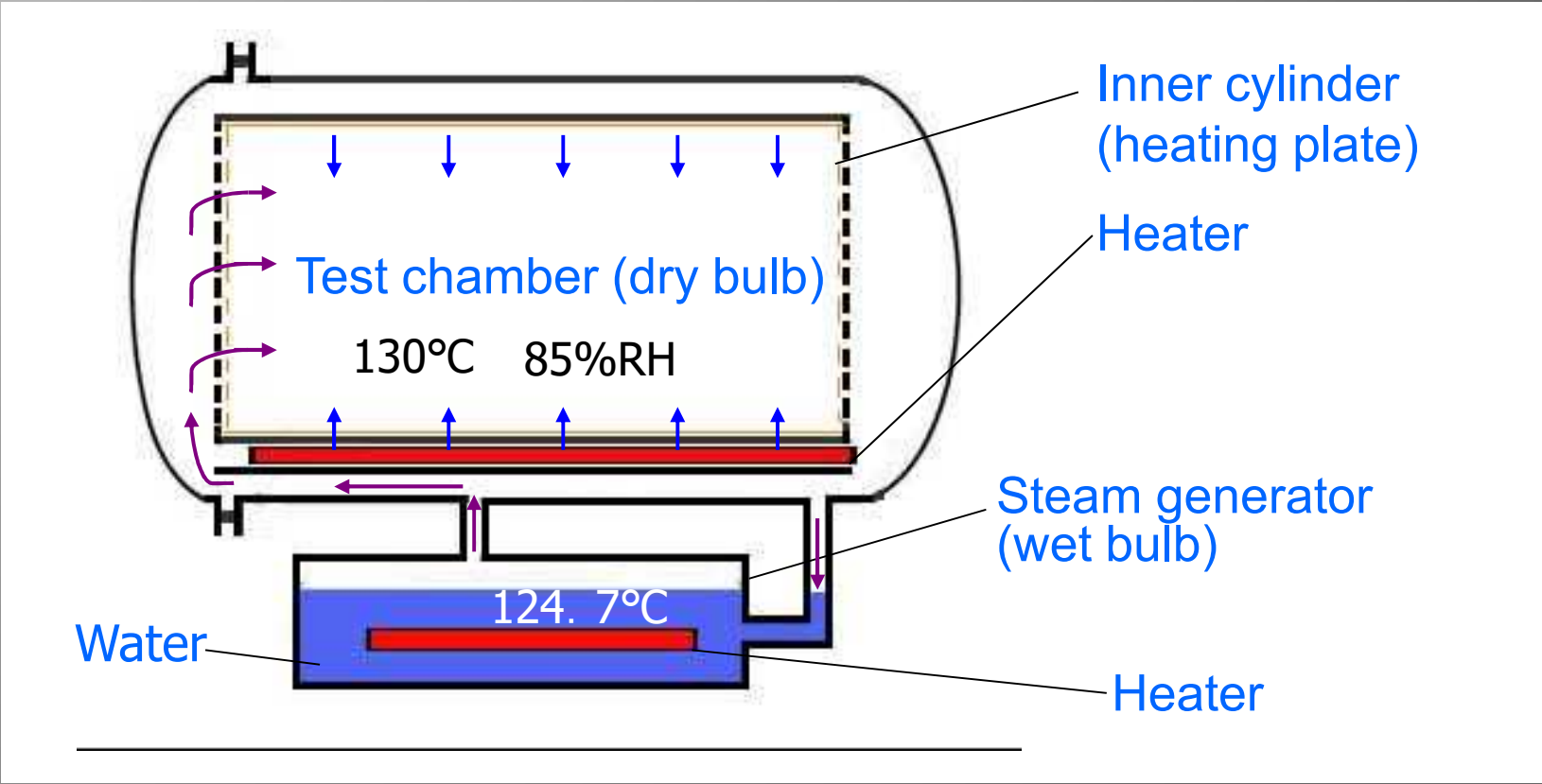
Basic Conditions of HAST

Basic conditions of HAST are to apply severe stress to test samples by heating, humidifying and pressurizing the inside of the pressure vessel.



Structure of Dual Vessel HAST Chamber

Example : 130°C 85%RH



HAST Testing Standards

Established by :

IEC=International Electrotechnical Commission

JIS=Japanese Industrial Standards

JEITA=Japan Electronics and Information
Technology Industries Association

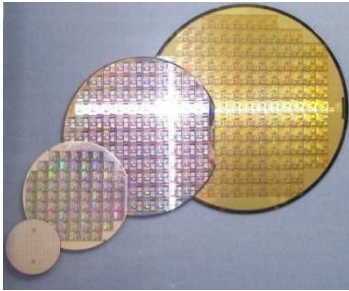
EIA/JEDEC= Electronic Industries Alliance(USA) /
Joint Electron Devices Engineering Council

JPCA=Japan Electronics Packaging and Circuits Association

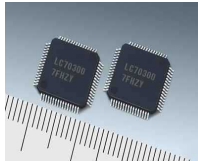
HAST Standards

Established by	Standard No.	Standard Name	Test Conditions			
			Temp. (°C)	Humid. (%RH)	Voltage	Time(h)
IEC	60068-2-66 60749	Environmental testing–Part2 Test methods: Test Cx: Damp heat, steady state (unsaturated pressurized vapour)	110±2 120±2 130±2	85±5 85±5 85±5	Any voltage	96,192,408 48,96,192 24,48,96
JEITA	EIAJ ED4701/100 102	Environmental and endurance test methods for semiconductor devices (life test) Temperature humidity bias (THB)	110±2 120±2 130±2	85±5 85±5 85±5	Apply voltage continuously or intermittently	Specified individually
JEDEC	JESD22-A110	Highly-Accelerated Temperature and Humidity Stress Test (HAST)	110±2 130±2	85±5 85±5	Apply voltage continuously or intermittently	264 96
JIS	JIS C 0096: 2001	Environmental testing–Part2 Test methods: Text Cx: Damp heat, steady state (unsaturated pressurized vapour)	110±2 120±2 130±2	85±5 85±5 85±5	Any voltage	96,192,408 48,96,192 24,48,96
JPCA	JPCA-ET08: 2002	Damp heat, steady state (unsaturated pressurized vapour)	110±2 120±2 130±2	85±5 85±5 85±5	Any voltage between DC5V -100V	96,192,408 48,96,192 24,48,96

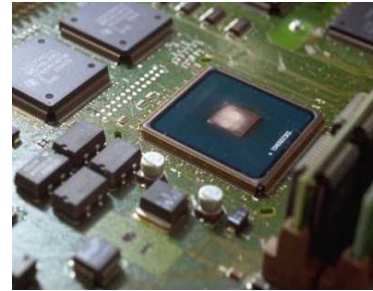
Typical Test Samples



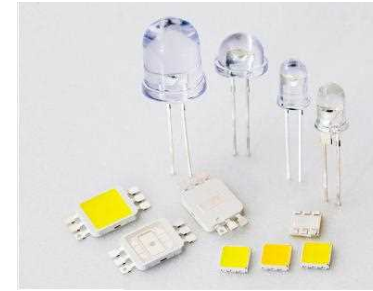
Silicon wafer



IC, LSI



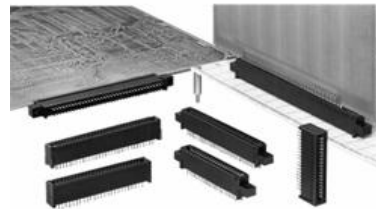
Electric and electronic parts



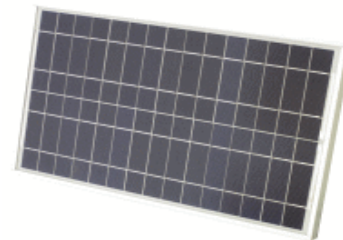
LED



Printed wiring board



Connector



Solar panel



Magnet

Other objects

Plastic material, Film, Adhesive, LCD, Coil, Paint, Plating, Glass, etc.

Comparing the Severeness of Test Conditions

(Based on JIS Standards)

Purpose :

The effect of high temperature and high humidity on the characteristic degradation of small electronic parts, mainly parts that are not hermetically sealed is acceleratedly evaluated.

High temperature high humidity test (JIS C 60068-2-67)

● Constant temperature and humidity chamber

Temperature °C	Relative humidity %	Testing time hour ※1			
		I	II	III	IV
85±2	85±5	168	504	1000	2000

High temperature high humidity, Steady state, Unsaturated pressure test(JIS C 0096: 2001)

● HAST chamber

Temperature °C	Relative humidity %	Testing time hour ※2		
		I	II	III
110±2	85±5	96	192	408
120±2	85±5	48	96	192
130±2	85±5	24	48	96

※1,2 Unless specified in the product standard, select one of the combinations of temperature and testing time from the above table.

Acceleration Factor (Reference data)

Test sample	High temp. High humid.	PCT (HAST)	Acc. factor	References
IC (Corrosion of aluminum)	85°C 85%	130°C 85%	30	Quoted from NTT Suzuki's paper
Transistor FET	85°C 85%	121°C 100%	20	many
Polyester film capacitor Tantalum capacitor	85°C 85% 60°C 95%	121°C 100% 121°C 100%	17	R80-37 R87-41
Resistor (Metal film)	85°C 85%	124.8°C 85%	40 - 50	R/M5-13,S-63
PCB (FR-4)	85°C 85%	120°C 85%	20	

R: The Institute of Electronics, Information and Communication Engineers (IEICE)
 R/M: Union of Japanese Scientists and Engineers (JUSE) , "Reliability symposium"

Highly Accelerated Stress Test Chamber (HAST Chamber)

Dual vessel unsaturated pressure cooker PC-R9 series

New HAST Chamber PC-R9 series

- Dual vessel structure having many advantages.
- Remote settings and operations.
- A highly accelerated stress test chamber (HAST chamber) that evolved smartly (wisely).



Highly Accelerated Stress Test Chamber (HASTChamber)

Features

PC-R9 series

- A new high-precision temperature/humidity programmable controller enables accelerated evaluation with higher accuracy than conventional HAST chambers.
- Remote operation is also possible.
It became possible to remotely operate equipment using a smartphone or tablet device.
- Even if many PC-R9s are used or PC-R9 is installed in a wide place, it can be monitored and controlled by a small number of operators.
- Smart (wise and quick) settings and operations



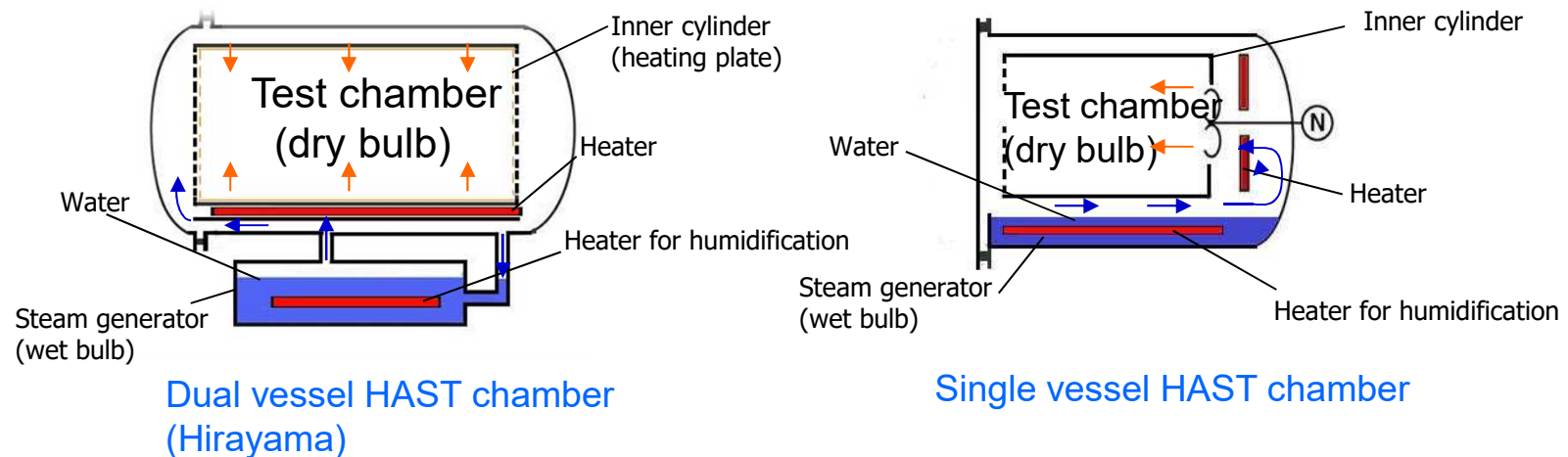
Remote operation



Structure of Dual Vessel HAST Chamber

The test chamber (dry bulb) and steam generator (wet bulb) are composed of two different pressure vessels that are completely separated and independent.

- Features**
- Effective dimensions are large. (Effective chamber volume: 67 L, Effective test space: 40 L)
- PC-422R9**
- Working temperature and humidity range is wide. (65-100%RH, Max. 150 °C at 65%RH)
 - An agitating fan is unnecessary. (Bearing maintenance is unnecessary.)
 - There is no worry about contamination in the chamber caused by wear of fan bearing.



Highly Accelerated Stress Test Chamber (HAST Chamber)

Dual Vessel Unsaturated Pressure Cooker

PC-242HSR2

Table top type



PC-R8 series

Floor-standing type



PC-R8D series

2 kinds of tests can be performed with one unit.



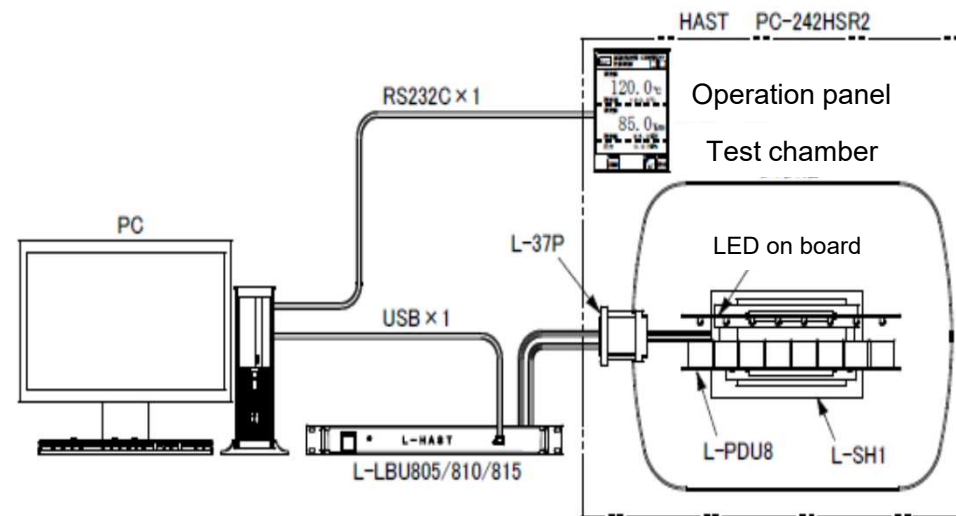
- Features**
1. Due to the dual vessel structure, the effective chamber dimensions are large and the working temperature / humidity range is wide.
 2. Chamber with excellent antifouling and cleaning properties to reduce contamination in the chamber.
 3. Slide tray type door that is excellent in operability and safety is employed.

Product Introduction

Accelerated LED Life Evaluation System (LED-HAST)



System configuration



That's all for our presentation on
Environmental Testing Equipment

Thank you for your attention

HIRAYAMA Manufacturing Corporation